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UNITED STATES DISTRICT COURT

DISTRICT OF OREGON

NORTHWEST ENVIRONMENTAL ADVOCATES, Plaintiff, v. UNITED STATES FISH AND WILDLIFE SERVICE and UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, Defendants.	Case No. 3:18-CV-01420-AC **MOTION TO COMPLETE AND SUPPLEMENT THE U.S. FISH AND WILDLIFE SERVICE'S ADMINISTRATIVE RECORD** **ORAL ARGUMENT REQUESTED**

MOTION

Plaintiff Northwest Environmental Advocates, by its undersigned counsel, hereby respectfully moves the Court for an order compelling defendant U.S. Fish and Wildlife Service to complete and supplement its administrative record with the documents listed in Appendix A and filed herewith as exhibits to the declaration of James N. Saul.

CERTIFICATION OF COMPLIANCE WITH LOCAL RULE 7-1(a)

Pursuant to Local Rule 7-1(a), the undersigned counsel certifies that the parties made a good faith effort through personal or telephone conferences to resolve the dispute and have been unable to do so.

MEMORANDUM

INTRODUCTION

This is the third case brought by Plaintiff Northwest Environmental Advocates ("NWEA") in its years-long effort to ensure that Oregon's aquatic life water quality criteria for toxic pollutants are sufficiently protective of threatened and endangered species—particularly salmonids such as bull trout—that depend on Oregon's rivers and streams for spawning, foraging, and migration. *See* Compl., Dkt. #1, ¶¶ 46-50. Specifically, this case involves a 2012 Biological Opinion ("2012 Oregon BiOp") written by the U.S. Fish and Wildlife Service ("Service") for Oregon's revised aquatic life water quality criteria for toxic pollutants, and the U.S.

Environmental Protection Agency's ("EPA") approval of those criteria in reliance on that BiOp.[1]

The Service concluded in the 2012 Oregon BiOp that Oregon's revised aquatic life water quality criteria for dozens of toxic pollutants would not cause jeopardy to threatened bull trout or result in the adverse modification of bull trout critical habitat. *See* Compl. ¶¶ 50-59.[2] But three years later, in a separate biological opinion issued for the State of Idaho's revised aquatic life water quality criteria, the Service reached the opposite conclusion with respect to arsenic, selenium, and zinc, finding that the same or even stricter criteria proposed by Idaho for those three toxics were likely to jeopardize the continued existence of bull trout and adversely affect bull

[1] In 2004, Oregon submitted its revised water quality criteria for dozens of toxic pollutants to EPA for review and approval under the Clean Water Act, 33 U.S.C. § 1313(c). EPA's proposed approval of those criteria was the "federal action" that triggered consultation with the Service under the Endangered Species Act (ESA), 16 U.S.C. § 1536(a)(2). As a result of that inter-agency consultation, and as required by the ESA, the Service issued a biological opinion "evaluating whether the proposed action is likely to jeopardize the continued existence of listed species." *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 839 F. Supp. 2d 1117, 1121 (D. Or. 2011) (citing 16 U.S.C. §§ 1536(a)(4), (b); 50 C.F.R. § 402.14).

[2] Relevant excerpts from the 2012 Oregon BiOp are filed as Exhibit 23 to the accompanying Saul Declaration. That BiOp contains approximately eight pages of analysis directly relevant to the potential effects of Oregon's revised arsenic and zinc criteria on bull trout (*see id.* at NWEA_000771 to NWEA_000779); only discusses the effects of Oregon's proposed selenium criteria on all fish collectively (i.e., not specific to bull trout) over about seven pages (*see id* at NWEA_000790 to NWEA_000797); and devotes an additional eight pages to the discussion of the aggregate effects of all of the proposed revised water quality criteria (i.e., not specific to arsenic, selenium, or zinc) on bull trout critical habitat (*see id*. at NWEA_000780 to NWEA_000789).

trout critical habitat. *Id.* ¶¶ 62-67.[3] The 2015 Idaho BiOp contains considerably more robust scientific analysis regarding bull trout, reaching a "jeopardy" determination based upon part upon the scientific studies at issue in this motion.

By this motion, NWEA seeks to compel the Service to complete or, alternatively, supplement its administrative record in this case with 21 documents, listed below in Appendix A and concurrently filed as exhibits to the accompanying Saul Declaration, all of which are published scientific journal articles, reports, presentations, posters, or book chapters[4] that directly relate to the Service's consideration of the potential effects of exposure to arsenic, selenium, or zinc on bull trout; pre-date the 2012 Oregon BiOp under review in this case; and were expressly considered and relied upon by the Service three years later when it reached its "jeopardy" opinion in the 2015 Idaho BiOp. These studies belong in the Service's administrative record; they were both available to and indirectly considered by the agency when it prepared the 2012 Oregon BiOp, and therefore NWEA's motion to complete the administrative record should be granted.

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[3] The 2015 Idaho BiOp is filed as Exhibit 22 to the accompanying Saul Declaration. The 2015 Idaho BiOp addresses the effects of each of the toxic pollutants arsenic, selenium, and zinc independently, on both bull trout and its critical habitat over about 18 pages in total, with an additional four pages on the cumulative effects of all pollutants. *See id.* at NWEA_000558 to NWEA_000565; NWEA_000606 to NWEA_000610; NWEA_000617 to NWEA_000621; and NWEA_000670 to NWEA_000674.

[4] For ease of reference, NWEA refers to these 21 documents collectively as "the 21 studies."

However, to the extent the Court finds that the Service properly excluded the 21 studies from its administrative record in the first instance, the Court should nonetheless order that the record be *supplemented* with them under the standard articulated in *Lands Council v. Powell*, 395 F.3d 1019, 1030 (9th Cir. 2005). As the Service implicitly recognized when it relied upon them in the 2015 Idaho BiOp, these documents comprise, in part, the "best scientific and commercial data available" related to the effects of arsenic, selenium, and zinc on bull trout, 16 U.S.C. § 1536(a)(2), and their addition to the administrative record here is "necessary to determine whether the agency has considered" all factors relevant to its biological opinion. *Lands Council*, 395 F.3d at 1030.

Finally, NWEA asks the Court to order supplementation of the Service's administrative record with the 2015 Idaho BiOp itself. Although that BiOp post-dates the 2012 Oregon BiOp at issue in this case, its inclusion in the record here will further effective judicial review because it shows how the Service ignored important aspects of the problem, and because its inclusion will allow the parties and the Court to "explain technical terms or complex subject matter" contained in the underlying 21 biological studies. *Id*.

ARGUMENT

NWEA's first claim for relief challenges the adequacy of the Service's 2012 Oregon BiOp, and it arises under the Administrative Procedure Act (APA), 5 U.S.C. § 706(2). Review of that claim is thus ordinarily bound to "the whole record or those

parts of it cited by a party[.]" *Id*.[5] NWEA alleges that the Service's 2012 Oregon BiOp was arbitrary and capricious under Section 706(2)(A) of the APA because, *inter alia*, the Service (a) ignored "existing and more relevant studies of the effects of arsenic on bull trout, cutthroat trout, and rainbow trout"; (b) "failed to use the best available scientific information as required by" the ESA; and (c) "ignored other relevant scientific data and information related to the direct and cumulative impacts of toxics on bull trout[.]" Compl. ¶ 72(A), (C).

Evidence of these deficiencies is found, in part, by comparing the 2012 Oregon BiOp to the Service's 2015 Idaho BiOp—a document that contains more thorough analysis of the effects of the same (or more stringent) water quality criteria for arsenic, selenium, and zinc on bull trout in Idaho, and in which the Service concluded that those criteria would likely result in jeopardy to bull trout or adverse modification of bull trout habitat. In the Service's analysis of the effects of arsenic, selenium, and zinc on bull trout in the 2015 Idaho BiOp, it relied in part upon the 21 studies listed in Appendix A—studies that go unmentioned in the 2012 Oregon BiOp and are not found in the Service's administrative record here.

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[5] NWEA's remaining three claims arise under the citizen suit provision of the Endangered Species Act, 16 U.S.C. § 1540(g)(1), and are not bound to an administrative record. Instead, the Court "may consider evidence outside the administrative record for the limited purposes of reviewing" those claims. *W. Watersheds Project v. Kraayenbrink*, 632 F.3d 472, 497 (9th Cir. 2011); *see also Wash. Toxics Coal. v. Envtl. Prot. Agency*, 413 F.3d 1024, 1034 (9th Cir. 2005). Thus NWEA may file and rely upon the documents at issue in this motion in support of its second, third, and fourth claims, but it also seeks to add them to the Service's administrative record here so that the Court may consider them in support of NWEA's first claim.

When engaging in interagency consultation and offering its biological opinion under Section 7 of the ESA, the Service has a statutory obligation to "use the best scientific and commercial data available," 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8), and must proactively search for, identify, and apply those data. *See, e.g.*, 50 C.F.R. § 402.14(g)(1) (requiring the Service to "[r]eview all relevant information provided by the Federal agency *or otherwise available*") (emphasis added). In short, the Service "cannot ignore available biological information" when preparing its biological opinions under ESA Section 7. *Conner v. Burford,* 848 F.2d 1441, 1454 (9th Cir. 1988). Indeed, the failure to do so violates the APA. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 184 F. Supp. 3d 861, 878 (D. Or. 2016) (quoting *San Luis & Delta–Mendota Water Auth. v. Locke*, 776 F.3d 971, 995 (9th Cir. 2014)); *see also Nat. Res. Def. Council, Inc. v. Pritzker*, 828 F.3d 1125, 1140 (9th Cir. 2016) (holding that the National Marine Fisheries Service's failure to use the "best scientific data available" showed that the agency had "failed to consider an important aspect of the problem," rendering the challenged rule arbitrary and capricious under the APA) (quoting *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983)).

With this background, and for the reasons stated below, NWEA seeks to compel the Service to complete or, alternatively, to supplement its administrative record with the 21 studies listed in Appendix A.

I. The Service's Administrative Record Must be Completed with the Addition of 21 Studies and Other Documents Indirectly Considered by the Agency when Preparing the 2012 Oregon BiOp

Judicial review under the APA is based upon a review of the "whole record" developed during the agency's decision-making process. *Citizens to Pres. Overton Park, Inc. v. Volpe*, 401 U.S. 402, 420 (1971). If the administrative record is incomplete, the Court will be unable to determine "whether an agency considered the relevant factors and has provided an explanation that rationally connects the data with the choice made." *Id.*; *see also Walter O. Boswell Mem'l Hosp. v. Heckler*, 749 F.2d 788, 792 (D.C. Cir. 1984) ("To review less than the full administrative record might allow a party to withhold evidence unfavorable to its case"). A complete administrative record is, therefore, essential for effective judicial review.

The proper scope of an administrative record is broad, and includes "everything that was before the agency pertaining to the merits of its decision." *Portland Audubon Soc'y. v. Endangered Species Comm.*, 984 F.2d 1534, 1548 (9th Cir. 1993). The administrative record is "not necessarily those documents that the *agency* has compiled and submitted as 'the' administrative record." *Thompson v. U.S. Dep't of Labor*, 885 F.2d 551, 555 (9th Cir. 1989). Rather, "[t]he 'whole' administrative record . . . consists of all documents and materials directly or indirectly considered by agency decision-makers and includes evidence contrary to the agency's position." *Id.* (internal quotation marks omitted).

Further, the record includes all documents that "might have influenced the agency's decision, and not merely those on which the agency relied in its final

decision." *In re United States*, 875 F.3d 1200, 1207 (9th Cir.), *cert. granted, judgment vacated on other grounds,* 138 S. Ct. 443 (2017) (internal quotation omitted)). *See also Ctr. for Biological Diversity v. Bureau of Land Mgmt.*, No. C-06-4884-SI, 2007 WL 3049869, *4 (N.D. Cal. Oct. 18, 2007) (declining to exclude documents from the record "simply because defendant did not 'rely' on them in arriving at the final decision," holding instead that because they were "before the BLM, they must also be before the Court as part of the administrative record"); *Fund for Animals v. Williams*, 391 F. Supp. 2d 191, 199 (D.D.C. 2005) ("The agency may not skew the record in its favor by excluding pertinent but unfavorable information. Nor may the agency exclude information on the grounds that it did not 'rely' on the excluded information in its final decision.").

Courts have generally recognized that completion of the administrative record is appropriate where a litigant has identified "with sufficient specificity" those documents omitted from the record, and provided a "reasonable, non-speculative grounds for the belief that the documents were considered by the agency" as part of the decision under review. *See, e.g.*, *Oceana, Inc. v. Pritzker*, No. 16-cv-06784, 2017 WL 2670733, at *2 (N.D. Cal. June 21, 2017).

Here, NWEA has rebutted whatever presumption of regularity the Service may enjoy in compiling the administrative record, and the Court should order the Service to add the 21 studies listed in Appendix A to its administrative record. Each of the studies was published in a peer-reviewed scientific journal or otherwise made available to the Service's staff biologists *prior to* issuance of the 2012 Oregon BiOp;

each one directly relates to the issues the Service was considering when it wrote that BiOp—specifically, the impact of arsenic, selenium, or zinc on endangered bull trout or its habitat; and each one was expressly relied upon and cited by the Service just three years later when it wrote the 2015 Idaho BiOp, which addressed the same pollutants and the same endangered species (among others). The Service cannot plausibly argue that these studies were not only available to, but were "directly or indirectly considered by," the agency when it wrote the 2012 Oregon BiOp. *Thompson*, 885 F.2d at 555.

II. The Service's Administrative Record Should Be Supplemented with the 21 Studies, As Well As the 2015 Idaho BiOp

If the Court finds that the 21 studies in Appendix A are not a part of the Service's administrative record and thus completion of the record is not warranted, it should nonetheless order the agencies to *supplement*[6] the record with the same 21 studies because their inclusion is necessary to show that the Service failed to use the best scientific data available when writing the 2012 Oregon BiOp, contrary to the ESA. In addition, the Court should order the same for the 2015 Idaho BiOp

[6] There is an important distinction, increasingly recognized by the courts, between "completion" and "supplementation" of the administrative record. *See, e.g. Oceana, Inc. v. Ross*, 290 F. Supp. 3d 73, 77-79 (D.D.C. 2018); *Audubon Soc'y of Portland v. Zinke*, No. 17-cv-00069, 2017 WL 6376464, at *4 (D. Or. Dec. 12, 2017); *Wildearth Guardians v. U.S. Forest Serv.*, 713 F. Supp. 2d 1243, 1252-53 & n.5 (D. Colo. 2010); *Miami Nation of Indians of Indiana v. Babbitt*, 979 F. Supp. 771, 777 (N.D. Ind. 1996). As those cases and others explain, different standards apply; "completion" is automatic once it becomes clear that an agency improperly omitted documents it directly or indirectly considered from its administrative record as filed with the court, whereas "supplementation"—that is, addition of extra-record evidence obtained through discovery or other means—requires an exception to the "whole record rule."

itself, which—because it post-dates the earlier Oregon BiOp—the Service properly excluded from the "complete" administrative record.

The Ninth Circuit has recognized that supplementation of the record—i.e., the inclusion of extra-record evidence—is appropriate in the following circumstances: "(1) if admission is necessary to determine 'whether the agency has considered all relevant factors and has explained its decision,' (2) if 'the agency has relied on documents not in the record,' (3) 'when supplementing the record is necessary to explain technical terms or complex subject matter,' or (4) 'when plaintiffs make a showing of agency bad faith.'" *Lands Council v. Powell*, 395 F.3d 1019, 1030 (9th Cir. 2005) (quoting *S.W. Ctr. for Biological Diversity v. U.S. Forest Serv.*, 100 F.3d 1443, 1450 (9th Cir. 1996)).

In the ESA context specifically, one "relevant factor" the Service must consider—and the reviewing court may assess—is the "best scientific data available" requirement under Section 7(a)(2) of the ESA. Indeed, as the Ninth Circuit has held, an agency's failure to use the best scientific data available can render the resulting BiOp arbitrary and capricious under the APA. *Pritzker*, 828 F.3d at 1140 (citing *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983)). It goes without saying that one way to succeed with such an argument is to show that the BiOp—and its associated administrative record—*lacks* discussion of the "best scientific data available," which must necessarily come from other extra-record sources.

Similarly, several district courts within the Ninth Circuit have noted that it is sometimes appropriate to look beyond the "complete" administrative record where necessary to assess whether an agency has considered all relevant factors in making decisions under the ESA. *See, e.g.*, *S. Yuba River Citizens League v. Nat'l Marine Fisheries Serv.*, No. CV S-06-2845 LKK/JFM, 2008 WL 11400759, at *11 (E.D. Cal. Dec. 23, 2008); *Trout Unlimited v. Lohn*, No. C05-1128C, 2006 WL 1207901, at *4 (W.D. Wash. May 4, 2006). In *South Yuba River*, for example, the court did not require *completion* of the administrative record with 19 studies as requested by the plaintiff, but nonetheless recognized that those studies could nonetheless be considered by the court when assessing the reasonableness of a BiOp under Ninth Circuit precedent. 2008 WL 11400759 at *11. The court reasoned that even though there was no indication that NMFS had "considered, or even been aware of," the studies when it issued the BiOp under review, the studies "could be relevant if they showed that [the National Marine Fisheries Service] did not consider the relevant factors in reaching its decision" as reflected in a "no jeopardy" BiOp. *Id*. For its part, the *Trout Unlimited* court required inclusion of a specific scientific study in the administrative record, reasoning that if the study "or the opinions contained therein appear that they *should* have been considered by" the agency in promulgating a regional ESA listing policy, "the fact that they *weren't* could cause the agency's adoption of the policy to be held to be arbitrary and capricious." 2006 WL 1207901, at *4 (emphasis added).

Here, supplementation is necessary under the first *Lands Council* criterion because the 21 studies, and the 2015 Idaho BiOp itself (which contains a significantly more robust analysis of the effects of arsenic, selenium, and zinc on endangered bull trout, including references to the 21 studies), show that the Service failed to comply with ESA Section 7(a)(2) and the Service's implementing regulations at 50 C.F.R. § 402.14(g)(8), and failed to consider all relevant factors related to the potential impacts of toxic water pollution on bull trout in Oregon. The 21 studies comprise, in part, the "best scientific . . . data available" regarding the effects of arsenic, selenium, and zinc on bull trout and its habitat, and indeed each of them was used by the Service in 2015 to inform the agency's determination that the same or more stringent water quality criteria for those three toxic pollutants would likely adversely affect bull trout in the State of Idaho.

This is not a case where NWEA seeks to re-open the administrative record "as a forum for the experts to debate the merits of the BiOp." *San Luis & Delta-Mendota Water Auth. v. Locke*, 776 F.3d 971, 993 (9th Cir. 2014) (citing *San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581, 603-04 (9th Cir. 2014)). To the contrary, NWEA seeks to supplement the record simply to show that the Agencies ignored available, relevant scientific studies and other information, thereby failing to "comply with the statutory requirement of a comprehensive biological opinion using the best information available[.]" *Conner*, 848 F.2d at 1454.

At the merits stage, NWEA will not be bound by the administrative record for its ESA citizen suit claims—i.e., claims two through four. *See W. Watersheds Project*

v. Kraayenbrink, 632 F.3d 472, 497 (9th Cir. 2011); *Wash. Toxics Coal. v. Envtl. Prot. Agency*, 413 F.3d 1024, 1034 (9th Cir. 2005). But supplementation of the Service's administrative record with the 21 studies shown in the Appendix, as well as the 2015 Idaho BiOp itself, is necessary to provide for effective judicial review of NWEA's first claim, arising under the APA. NWEA's motion to complete and supplement the Service's administrative record should be granted.

CONCLUSION

For the reasons stated above, NWEA respectfully requests that the Court grant its motion to complete the Service's administrative record by adding in the 21 documents listed in Appendix A or, in the alternative, to supplement the record by adding in those documents. In addition, NWEA respectfully requests that the Court order the Service to supplement its administrative record by adding in the 2015 Idaho BiOp.

Dated May 31, 2019.

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APPENDIX

Documents NWEA Seeks to Add to the Service's Administrative Record

Saul Decl. Ex. No.	Title and Author	Relevance	Use in 2015 Idaho BiOp
1.	Boyle, D., K.V. Brix, H. Amlund, A.-K. Lundebye, C. Hogstrand, and N.R. Bury. 2008. Natural arsenic contaminated diets perturb reproduction in fish. Environmental Science and Technology. 42(14): 5354 - 5360.	This study is relevant to the effects of arsenic in fish diets on fish reproduction.	Cited in subsection in arsenic bull trout section titled "Dietary Toxicity of Arsenic" See page 144: "[A]t least one study has shown that arsenic in fish diets can affect reproduction, although the single dietary exposure tested was higher (135 mg/kg dw) than in the studies mentioned with salmonids (Boyle et al. 2008, p. 5356)."
2.	Burgess, R.M., M.M. Perron, M.G. Cantwell, K.T. Ho, M.C. Pelletier, J.R. Serbst, and S.A. Ryba. 2007. Marine sediment toxicity identification evaluation methods for the anionic metals arsenic and chromium. Environmental Toxicology and Chemistry. 26(1): 61-67.	This study is relevant to identifying the risk of arsenic toxicity to salmon food and dietary organisms.	Cited in subsection in arsenic bull trout section titled "Arsenic Toxicity to Food Organisms" See pages 147–48: stating that "[t]he limited data available suggests that the risk of arsenic toxicity to salmonid food/dietary organisms is lower than the risk of arsenic toxicity to salmonids from eating arsenic-exposed organisms" and then discussing studies, including Burgess)
3.	Canivet, V., P. Chambon, and J. Gibert. 2001. Toxicity and Bioaccumulation of Arsenic and Chromium in Epigean and Hypogean Freshwater Macroinvertebrates. Archives of Environmental Contamination and Toxicology. 40(3): 345-354.	This study is relevant to identifying the risk of arsenic toxicity to salmon food and dietary organisms.	Cited in subsection in arsenic bull trout section titled "Arsenic Toxicity to Food Organisms" See pages 147–48: stating that "[t]he limited data available suggests that the risk of arsenic toxicity to salmonid food/dietary organisms is lower than the risk of arsenic toxicity to salmonids from eating arsenic-exposed organisms" and then discussing studies, including Canivet.
4.	Chapman, P.M., W.J. Adams, M.L. Brooks, C.G. Delos, S.N. Luoma, W.A. Maher, H.M. Ohlendorf, T.S. Presser, and D.P. Shaw, editors. 2009. Ecological assessment of selenium in the aquatic environment: Summary of a SETAC	This study is relevant to the impact of selenium on bull trout and other aquatic species.	Cited throughout sections discussing the proposed selenium criteria, including as support for the following statements regarding selenium risks to fish in bull trout section: See page 190: "Diet is the primary pathway of selenium exposure for both invertebrates and vertebrates."

Saul Decl. Ex. No.	Title and Author	Relevance	Use in 2015 Idaho BiOp
	Pellston Workshop. Pensacola FL (USA). Society of Environmental Toxicology and Chemistry (SETAC), http://www.setac.org/node/265.		See page 191: "Traditional methods for predicting toxicity on the basis of exposure to dissolved concentrations do not work for selenium because the behavior and toxicity of selenium in aquatic systems are highly dependent upon situation-specific factors, including food web structure and hydrology." See page 191: "Selenium toxicity is primarily manifested as reproductive impairment due to maternal transfer, resulting in embryo toxicity and teratogenicity in egg-laying vertebrates."
5.	Erickson, R.J., D.R. Mount, J.D. Fernandez, T.L. Highland, J.R. Hockett, D.J. Hoff, and C.T. Jenson. 2011a. Arsenic Toxicity to Juvenile Fish: Effects of Exposure Route, Arsenic Speciation, and Fish Species [platform presentation]. in Abstracts, SETAC North America 32nd Annual Meeting, November 16, 2011, Boston, MA. Society of Environmental Toxicology and Chemistry (SETAC), http://boston.setac.org/.	This presentation is relevant to the effects of arsenic in the diets of salmonids.	Cited on Page 145, Table 6, titled "Effects of arsenic in the diet of salmonids of selected observed and experimental concentrations," as demonstrating the effects of dietary arsenic on rainbow trout.
6.	Farag, A.M., D.F. Woodward, W.G. Brumbaugh, J.N. Goldstein, E. McConnell, C. Hogstrand, and F.T. Barrows. 1999. Dietary effects of metals-contaminated invertebrates from the Coeur d'Alene River, Idaho on cutthroat trout. Transactions of the American Fisheries Society. 129: 578-592.	This study is relevant to the impacts of dietary arsenic to salmonids, including bull trout.	Page 145: Cited in Table 6, titled "Effects of arsenic in the diet of salmonids of selected observed and experimental concentrations," as demonstrating the effects of dietary arsenic on cutthroat trout. Page 147: Cited in subsection in arsenic bull trout section titled "Tissue Concentrations of Arsenic Associated with Chronic Responses in Fish"
7.	Garrett, G.P. and C.R. Inman. 1984. Selenium-induced changes in fish populations of a heated reservoir.	This study is relevant to the impacts of selenium on bull trout	Cited in section discussing the proposed selenium criteria and bull trout as support for the following statements:

Saul Decl. Ex. No.	Title and Author	Relevance	Use in 2015 Idaho BiOp
	Proceedings of the 38th Annual Conference of the Southeast Association of Fish and Wildlife Agencies. 38: 291-301.	and other aquatic species.	See page 193: "[E]xposure to selenium at the proposed chronic criterion level … may indirectly affect the bull trout through reduced prey availability, or elevated sediment concentrations" See page 193: "If [bull trout] prey fish are less available or are available but constitute a lower quality food source, this may adversely impact individual bull trout and ultimately result in reduced weight gain, reduced reproductive success, and reduced survival."
8.	Hoff, D.J., T.L. Highland, J.R. Hockett, C.T. Jenson, and M. Poe. 2011. Dietary Arsenic Toxicity in Subadult Rainbow Trout: Growth Effects, Nutrient Absorption, and Tissue Bioaccumulation [poster] in Abstracts, SETAC North America 32nd Annual Meeting, November 16, 2011, Boston, MA. Society of Environmental Toxicology and Chemistry (SETAC), http://boston.setac.org/.	This presentation is relevant to the impacts of dietary arsenic in subadult rainbow trout.	Page 145: Cited in Table 6, titled "Effects of arsenic in the diet of salmonids of selected observed and experimental concentrations," as demonstrating the effects of dietary arsenic on subadult rainbow trout (see page 145) Pages 146-47: Cited in subsection in arsenic bull trout section titled "Tissue Concentrations of Arsenic Associated with Chronic Responses in Fish"
9.	Hogstrand, C. 2011. Zinc. Fish Physiology: Homeostasis and Toxicology of Essential Metals. 31(PART A): 135-200.	This study is relevant to the impacts of high concentrations of zinc in freshwater on aquatic life.	Cited in section on zinc aquatic life criteria for the following statements: "Natural concentrations of zinc in unpolluted freshwaters are typically less than 5 µg/L and are sufficient to meet nutritional needs[.]" (Page 197). "Little is known about mechanisms of sublethal toxicity in fish following long-term exposures; however, lethality is often a sensitive endpoint in chronic exposures of freshwater fish." (Page 197).
10.	Irving, E.C., R.B. Lowell, J.M. Culp, K. Liber, Q. Xie, and R. Kerrich. 2008. Effects of arsenic speciation and low	This study is relevant to identifying the risk of arsenic toxicity to	Cited in subsection in arsenic bull trout section titled "Arsenic Toxicity to Food Organisms"

Saul Decl. Ex. No.	Title and Author	Relevance	Use in 2015 Idaho BiOp
	dissolved oxygen condition on the toxicity of arsenic to a lotic mayfly. Environmental Toxicology and Chemistry. 27(3): 583–590	salmon food and dietary organisms.	See pages 147–48: Stating that "[t]he limited data available suggests that the risk of arsenic toxicity to salmonid food/dietary organisms is lower than the risk of arsenic toxicity to salmonids from eating arsenic-exposed organisms" and then discussing studies, including Irving.
11.	Lemly, A.D. and J.P. Skorupa. 2007. Technical issues affecting the implementation of US Environmental Protection Agency's proposed fish tissue–based aquatic criterion for selenium. Integrated Environmental Assessment and Management. 3(4): 552–558.	This study is relevant to the effects of selenium on bull trout.	Cited in section discussing the proposed selenium criteria and bull trout See page 192: citing Lemly as an example of a review that concluded that "5 ug/L of total selenium in water may not always be protective, whereas a concentration of 2 ug/L would be"
12.	McIntyre, D.O. and T.K. Linton. 2011. Arsenic. Fish Physiology: Homeostasis and Toxicology of Non-Essential Metals. 31(PART B): 297-349.	This study is relevant to proposed arsenic criteria and its effects on aquatic life, including bull trout.	Cited in sections discussing the proposed arsenic criteria and its effects on the environment and aquatic life, including bull trout (see pages 139, 143, 146, 147)
13.	Palace, V.P., C. Baron, R.E. Evans, J. Holm, S. Kollar, K. Wautier, J. Werner, P. Siwik, G. Sterling, and C.F. Johnson. 2004. An assessment of the potential for selenium to impair reproduction in bull trout, Salvelinus confluentus, from an area of active coal mining. Environmental Biology of Fishes. 70(2): 169-174.	This study is relevant to the impact of selenium on bull trout reproduction.	Cited in section discussing the proposed selenium criteria and its effects on bull trout: See page 191: "Palace et al. (2004, entire) analyzed selenium concentrations in the muscle tissue of bull trout sampled in a river with elevated selenium concentrations caused by coal mining. Selenium residues in bull trout muscle were elevated to the point that the authors considered selenium likely to cause recruitment impairment in a declining bull trout population. However, Palace et al. (2004, entire) reached this conclusion by assuming that selenium toxicity and tissue relations in rainbow trout and brook trout were relevant to bull trout. Although no specific toxicity test data for the bull trout were located during this consultation, reproductive toxicity testing that involved relating the occurrences of unviable or deformed fry to selenium concentrations in eggs has been conducted with rainbow

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			trout and two char species (the brook trout and the Dolly Varden) closely related to the bull trout."
14.	Pedlar, R.M., M.D. Ptashynski, R. Evans, and J.F. Klaverkamp. 2002. Toxicological effects of dietary arsenic exposure in lake whitefish (Coregonus clupeaformis). Aquatic Toxicology. 57(3): 167-189.	This study is relevant to the impacts of dietary arsenic to salmonids, including bull trout.	Cited in subsection in arsenic bull trout section titled "Dietary Toxicity of Arsenic" (see page 144, discussing studies demonstrating adverse effects of dietary arsenic to salmonds and citing *Pedlar*) Cited in Table 6, titled "Effects of arsenic in the diet of salmonids of selected observed and experimental concentrations," as demonstrating the effects of dietary arsenic on lake whitefish (see page 145)
15.	Presser, T.S. 2013. Selenium in ecosystems within the mountaintop coal mining and valley-fill region of southern West Virginia-assessment and ecosystem-scale modeling. U.S. Geological Survey, Professional Paper, U.S. Geological Survey Professional Paper 1803, Reston, VA. 86 pp.	This study is relevant to the impact of selenium on fish reproduction and what selenium water aquatic life criteria would be protective for aquatic species.	Cited in section discussing the proposed selenium criteria and bull trout as an example of a study considering what selenium aquatic life criteria "would provide protection for adherence to both the Clean Water Act and the Endangered Species Act" (see page 192)
16.	Scherer, E. and R.E. McNicol. 1998. Preference-avoidance responses of lake whitefish (Coregonus clupeaformis) to competing gradients of light and copper, lead, and zinc. Water Research. 32(3): 924-929.	This study is relevant to the sublethal effects of zinc on fish.	Discussed in section on zinc aquatic life criteria, in paragraph addressing the sublethal effects of zinc on fish (see page 198)
17.	Schmidt, T.S., W.H. Clements, R.E. Zuellig, K.A. Mitchell, S.E. Church, R.B. Wanty, C.A. San Juan, M. Adams, and P.J. Lamothe. 2011. Critical tissue residue approach linking accumulated metals in aquatic insects to population and community-level effects. Environmental Science and Technology. 45(16): 7004–7010.	This study is relevant to the impact of zinc on bull trout prey species.	Cited in section discussing proposed zinc criteria and its effects on bull trout See page 204: "The effects of elevated zinc concentrations on aquatic insect populations are complex and some information suggests measurable losses of sensitive, known bull trout prey species could occur at concentrations less than the proposed aquatic life criteria (Schmidt et al. 2011)."

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18.	Williams, G., J.M. West, and E.T. Snow. 2008. Total arsenic accumulation in yabbies (Cherax destructor clark) exposed to elevated arsenic levels in Victorian gold mining areas, Australia. Environmental Toxicology and Chemistry. 27(6): 1332–1342.	This study is relevant to identifying the risk of arsenic toxicity to salmon food and dietary organisms.	Cited in subsection in arsenic bull trout section titled "Arsenic Toxicity to Food Organisms" See pages 147–48: stating that "[t]he limited data available suggests that the risk of arsenic toxicity to salmonid food/dietary organisms is lower than the risk of arsenic toxicity to salmonids from eating arsenic-exposed organisms" and then discussing studies, including Williams)
19.	Williams, L., R.A. Schoof, J.W. Yager, and J.W. Goodrich-Mahoney. 2006. Arsenic bioaccumulation in freshwater fishes. Human and Ecological Risk Assessment: An International Journal. 12(5): 904-923.	This study is relevant to the impacts of dietary arsenic to salmonids, including bull trout.	Discussed in subsection in arsenic bull trout section titled "Dietary Toxicity of Arsenic" (see pages 144–45)
20.	Woodward, D.F., A.M. Farag, H.L. Bergman, A.J. DeLonay, E.E. Little, C.E. Smith, and F.T. Barrows. 1995. Metals-contaminated benthic invertebrates in the Clark Fork River, Montana: effects on age-0 brown trout and rainbow trout. Canadian Journal of Fisheries and Aquatic Sciences. 52:1994-2004.	This study is relevant to the impacts of dietary arsenic to salmonids, including bull trout.	Discussed in subsection in arsenic bull trout section titled "Dietary Toxicity of Arsenic" (see pages 143, 145, 147; see also page 129) Cited in Table 6, titled "Effects of arsenic in the diet of salmonids of selected observed and experimental concentrations," as demonstrating the effects of dietary arsenic on rainbow trout (see page 145)
21.	Woodward, D.F., J.N. Goldstein, A.M. Farag, and W.G. Brumbaugh. 1997. Cutthroat trout avoidance of metals and conditions characteristic of a mining waste site: Coeur d'Alene River, Idaho. Transactions of the American Fisheries Society. 126(4): 699-706.	This study is relevant to the sublethal effects of zinc on fish.	Discussed in section on zinc aquatic life criteria, in paragraph addressing the sublethal effects of zinc on fish See page 198: "Woodward et al. (1997) tested the avoidance behavior of the cutthroat trout to zinc concentrations and reported that the cutthroat trout avoided zinc concentrations as low as 52 µg/L, which was lower than the proposed acute zinc criterion of 66 µg/L at the (unmeasured) target test water hardness value of 50 mg/L."